CCD production testing progress

Donna

13Jul2009

I’m vacationing at Single Dish Summer School, Arecibo Observatory!

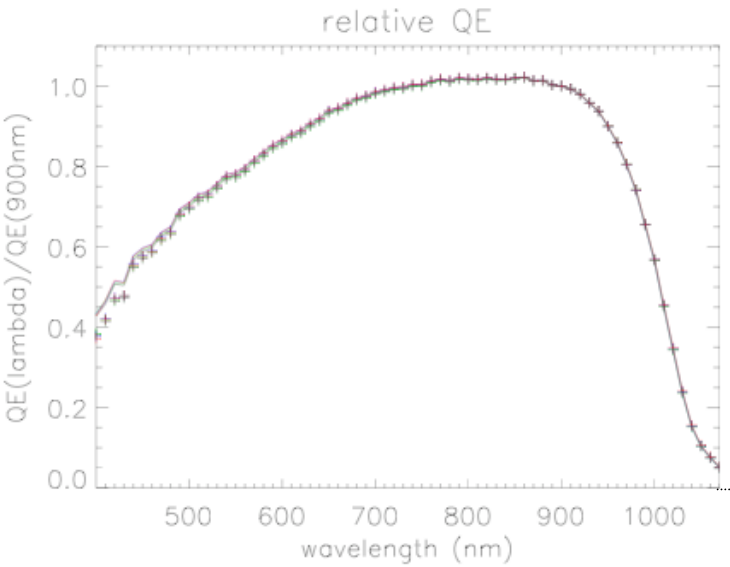
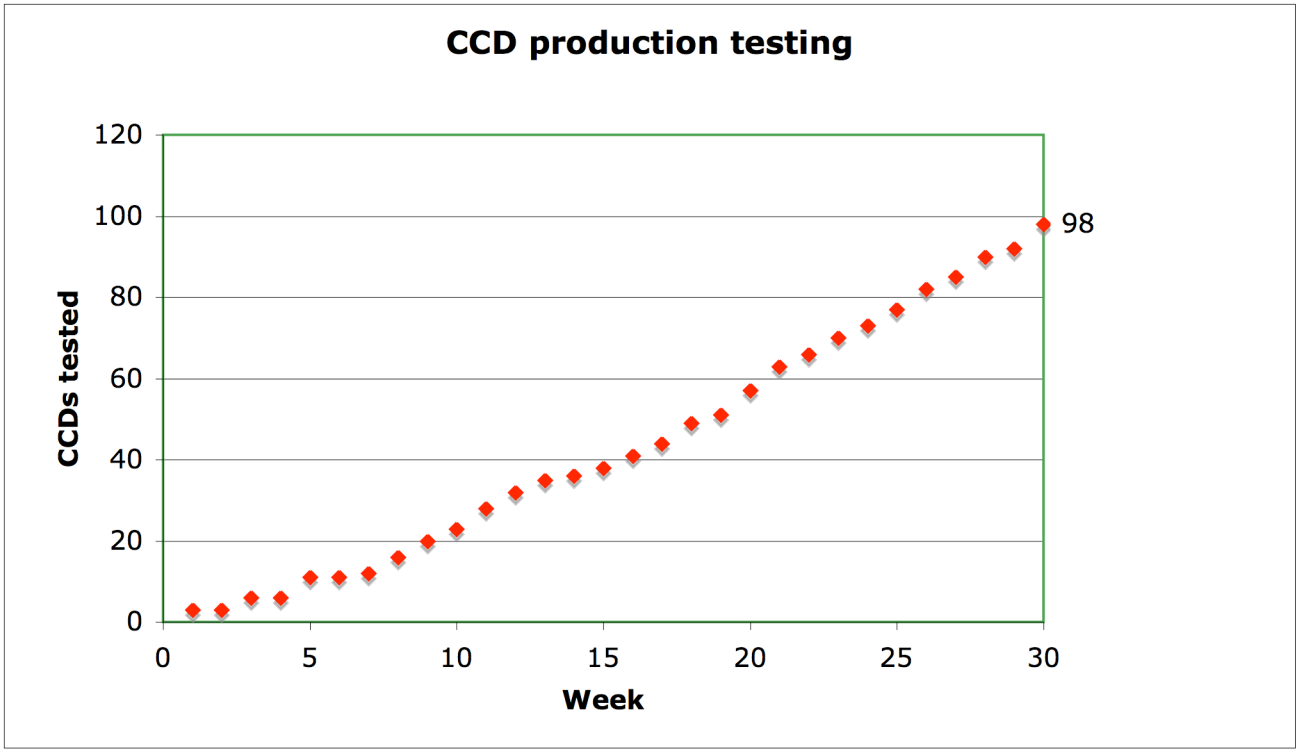


Figure 39: Relative QE with Kfactor applied

210,000,000
wavelength (nm)

CCD production testing

	Bin	*Frequency*
Science	2	27
Maybe	1	20
Intermittant	0.5	10
Failed	0	39
Pending further analysis	-1	2
total		98



CCD production testing

Last week

93	30	s3-165	112094-1-4	2A			2	science			snowstrom
94	30	s3-166	124750-1-3	2E			2	science; marginal dark current 27e- left side			windstorm
95	30	s3-152	124750-1-4	2E			1	fails V CTI per EPER nd 55Fe			snowstorm
96	30	s3-171	112094-18-3	2A			1	marginal dark current (34e-)			windstorm
97	30	s3-179	112094-18-1	2A			0	Huge lightbulb/glow on bottom right			typhoon
98	30	s3-183	123194-18-4	2C			-1	testing in progress			windstom

Totals

	Bin	*Frequency*
Science	2	27
Maybe	1	20
Intermittant	0.5	10
Failed	0	39
Pending further analysis	-1	2
total		98

Outline

- Update of past testing
- Report on Week 30 (this week)

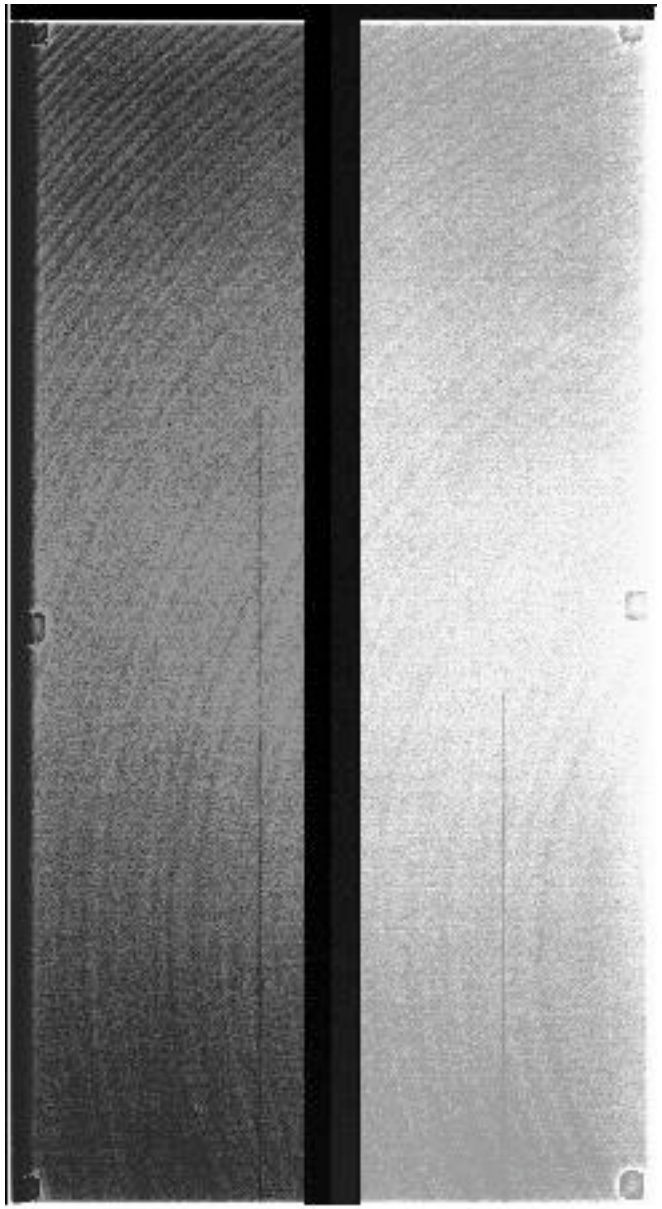
Update from past testing

Finished analysis of s3-98

- S3-98 (was -1 now 1) *(Stage1 and Stage2) Typhoon*
  - Evidence for bad V CTI in Fe55 and EPER as shown on following slides.

s3-98 124750-16-4 2E

S3-98



S3-98 fails V CTI on right and left

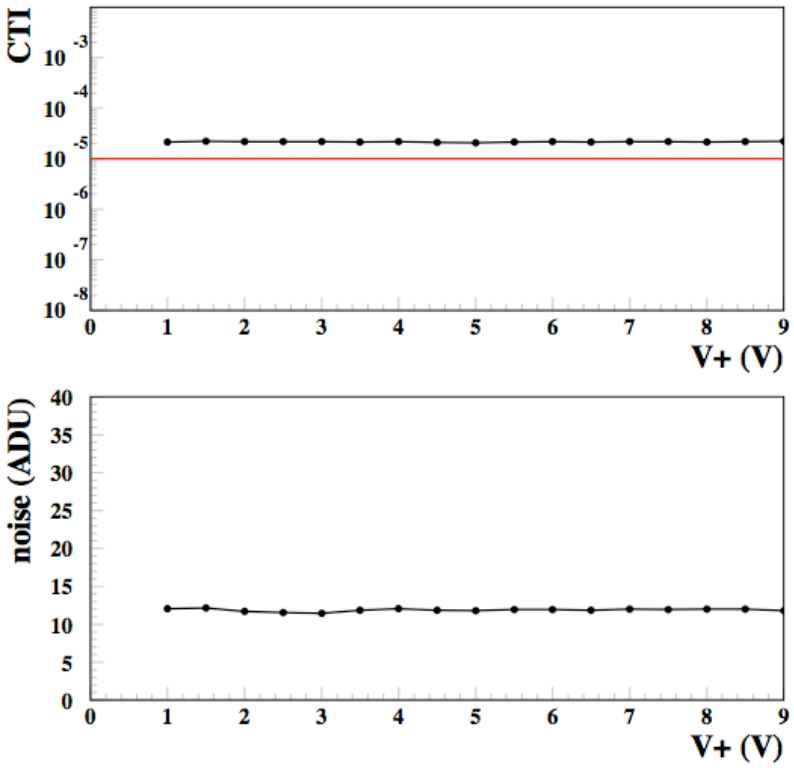


Figure 19: Top: Vertical CTI as a function of V+. Bottom: Measured noise as a function of V+.

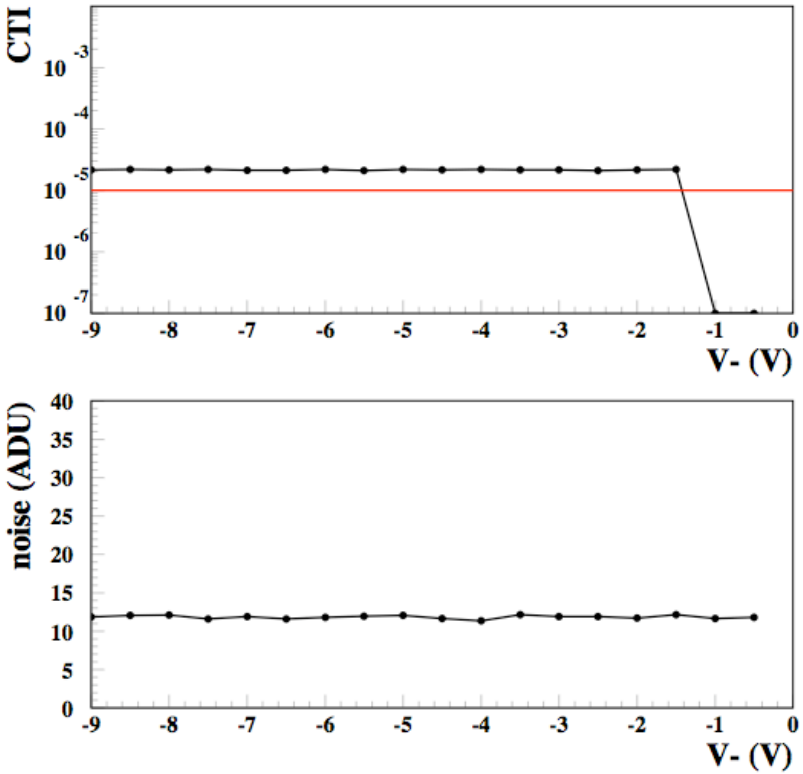
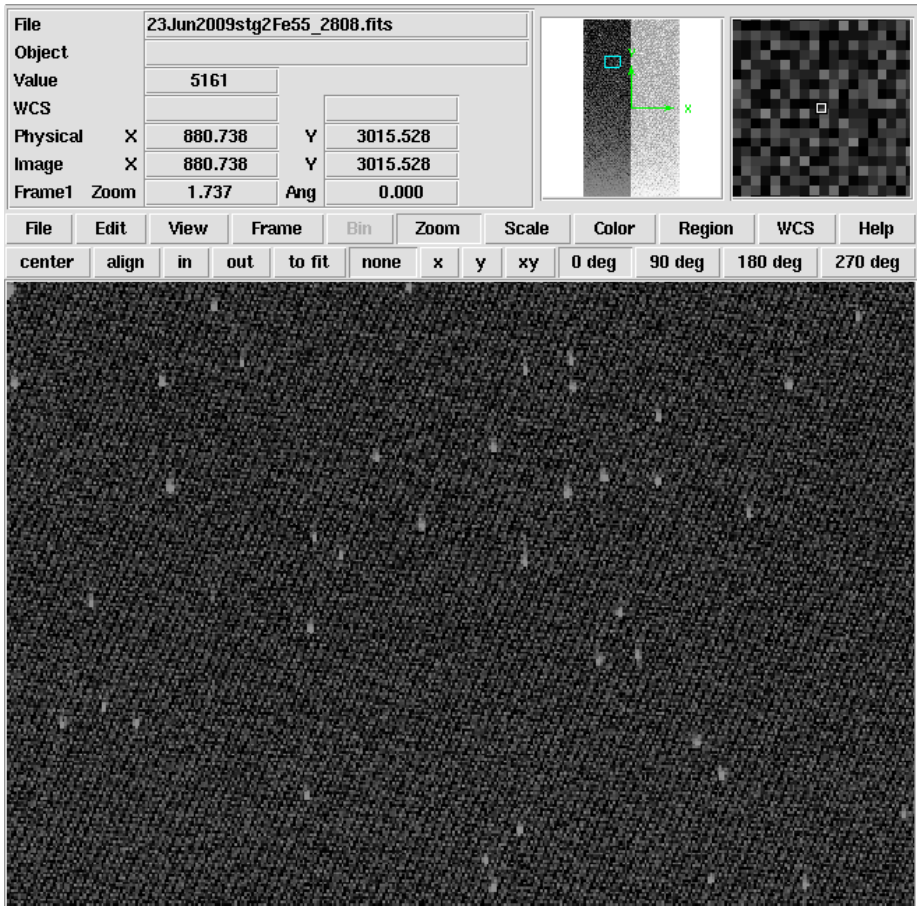
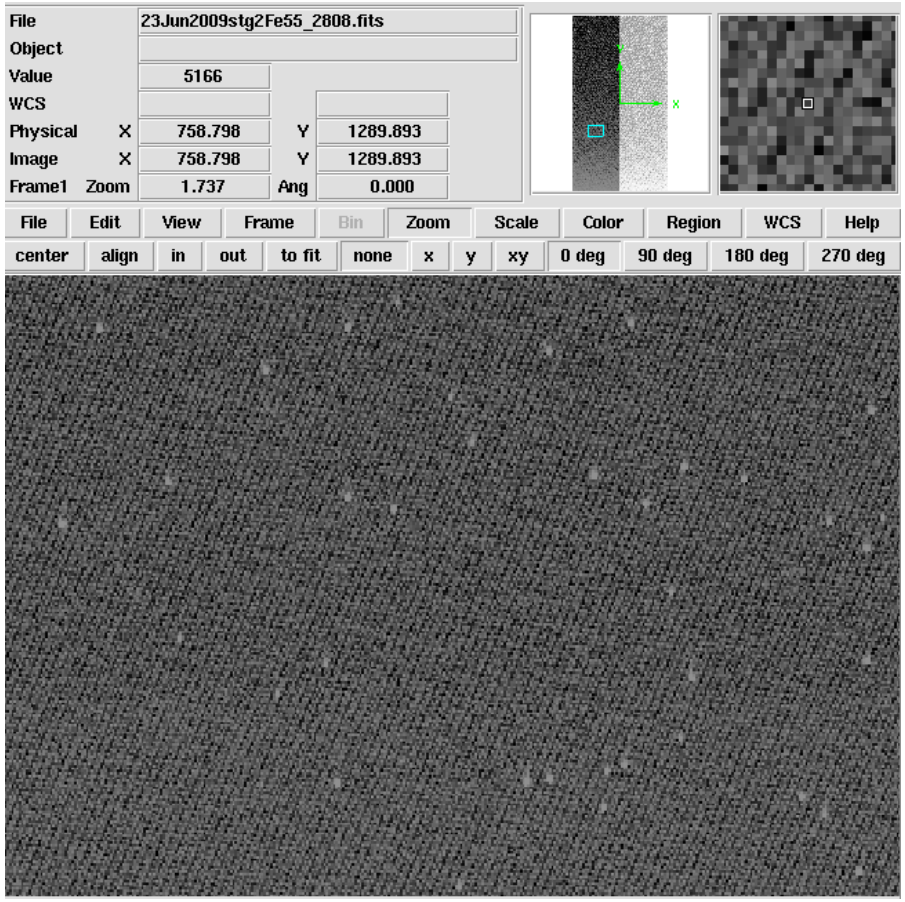


Figure 21: Top: Vertical CTI as a function of V-. Bottom: Measured noise as a function of V-.

S3-98 (left side)
Evidence for bad V CTI in ^{55}Fe Images

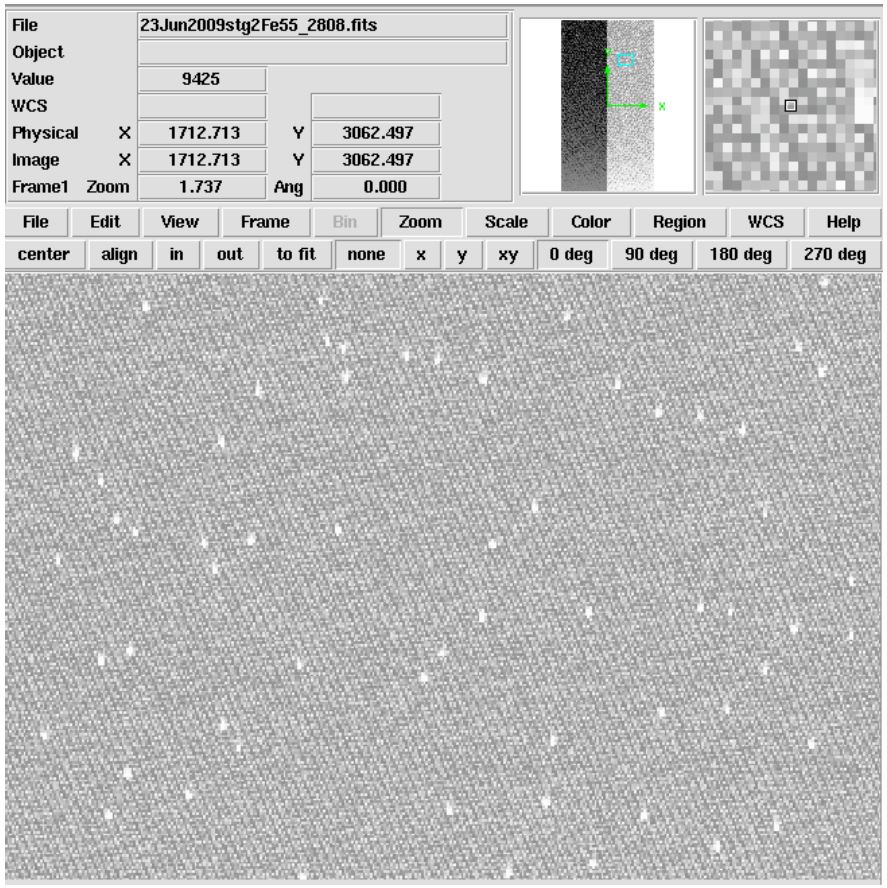


^{55}Fe left top

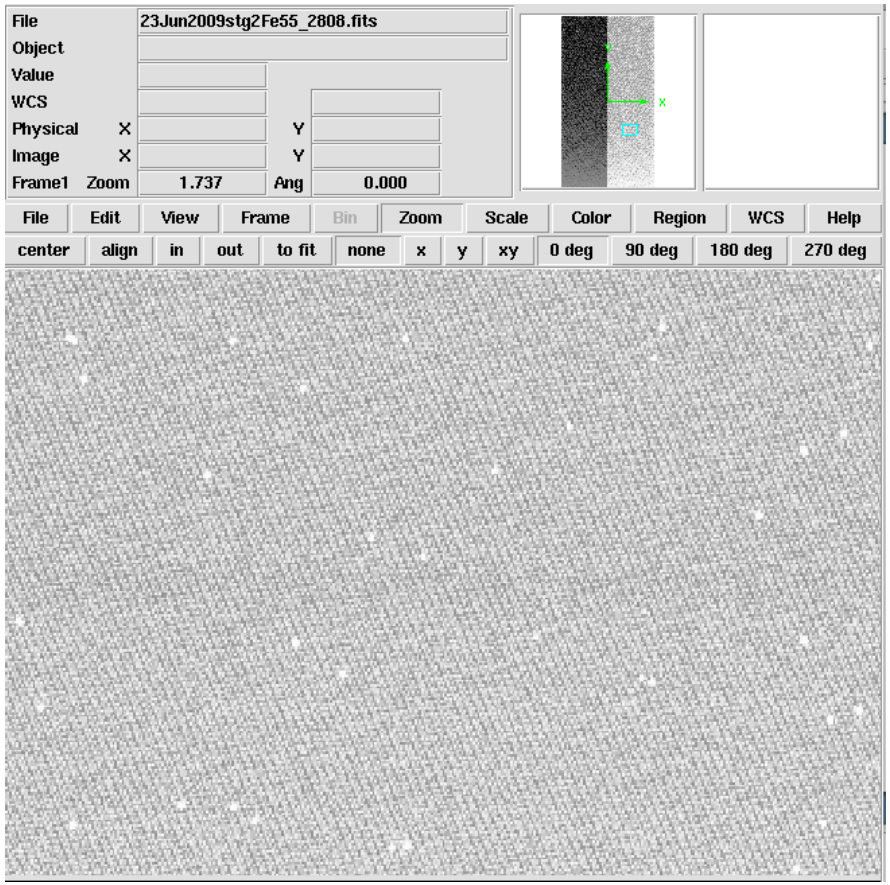


^{55}Fe left bottom

S3-98 (right side)
Evidence for bad V CTI in ^{55}Fe Images



^{55}Fe right top



^{55}Fe right bottom

Week 30
Last week

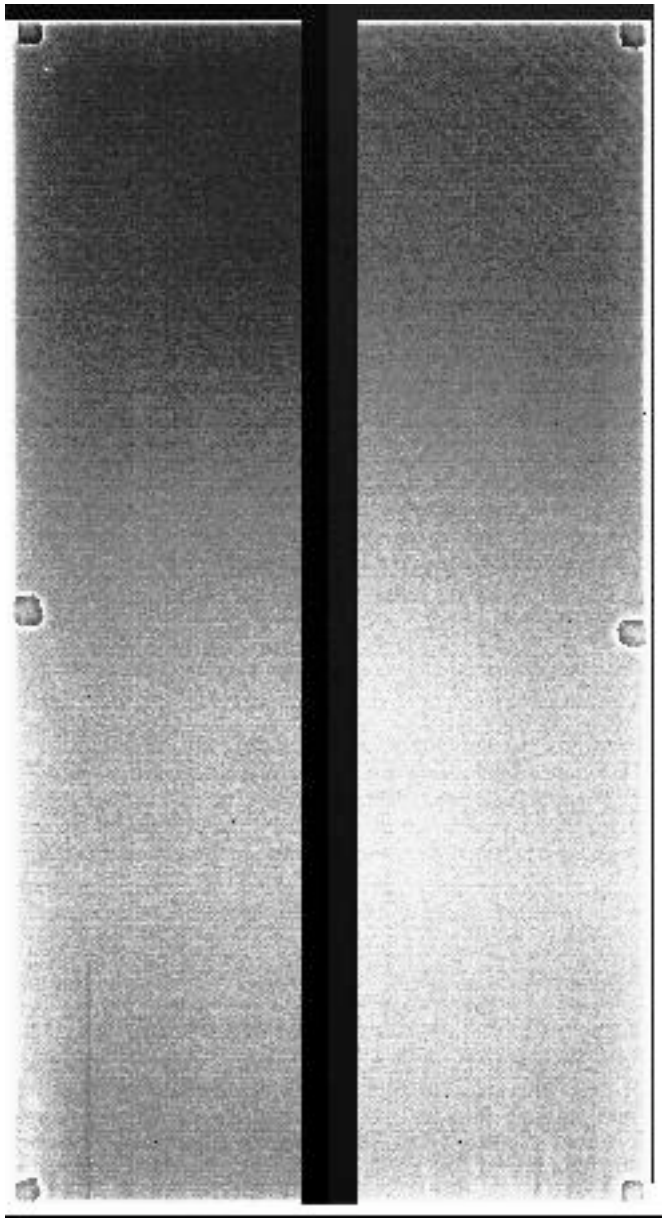
- S3-165 Grade 2 *(Stage1 and Stage2) Snowstorm*
- S3-166 Grade 2 *(Stage 1 and Stage 2) Windstorm*
  - Dark current on right is marginal (27e-) but assigned grade 2
- S3-152 Grade 1 *(Stage1 and Stage2) Snowstorm*
  - Bad V CTI seen in EPER and ^{55}Fe
- S3-171 Grade 1 (or 2?) *(Stage 1 and Stage 2) Windstorm*
  - Marginal dark current (34e-). Should we rate this as science?
- S3-179 Grade 0 (*No testing*) *Typhoon*
  - Huge glow on right bottom Typhoon

s3-165 112094-1-4 2A

S3-165

grade 2

science



Full well question

- The following 2 slides (and a few similar pairs of slides shown for other CCDs later in the presentation) show the exposure time corresponding to full well and the bottom right region of the CCD corresponding to full well.

- I just want to be sure we aren't getting some bad regions on the CCD when we claim we are at full well.

- We talked about this last week, and the glowing edge on the bottom is saturating as we near full well.

- So I think it's ok, but I'd like others to look at this.

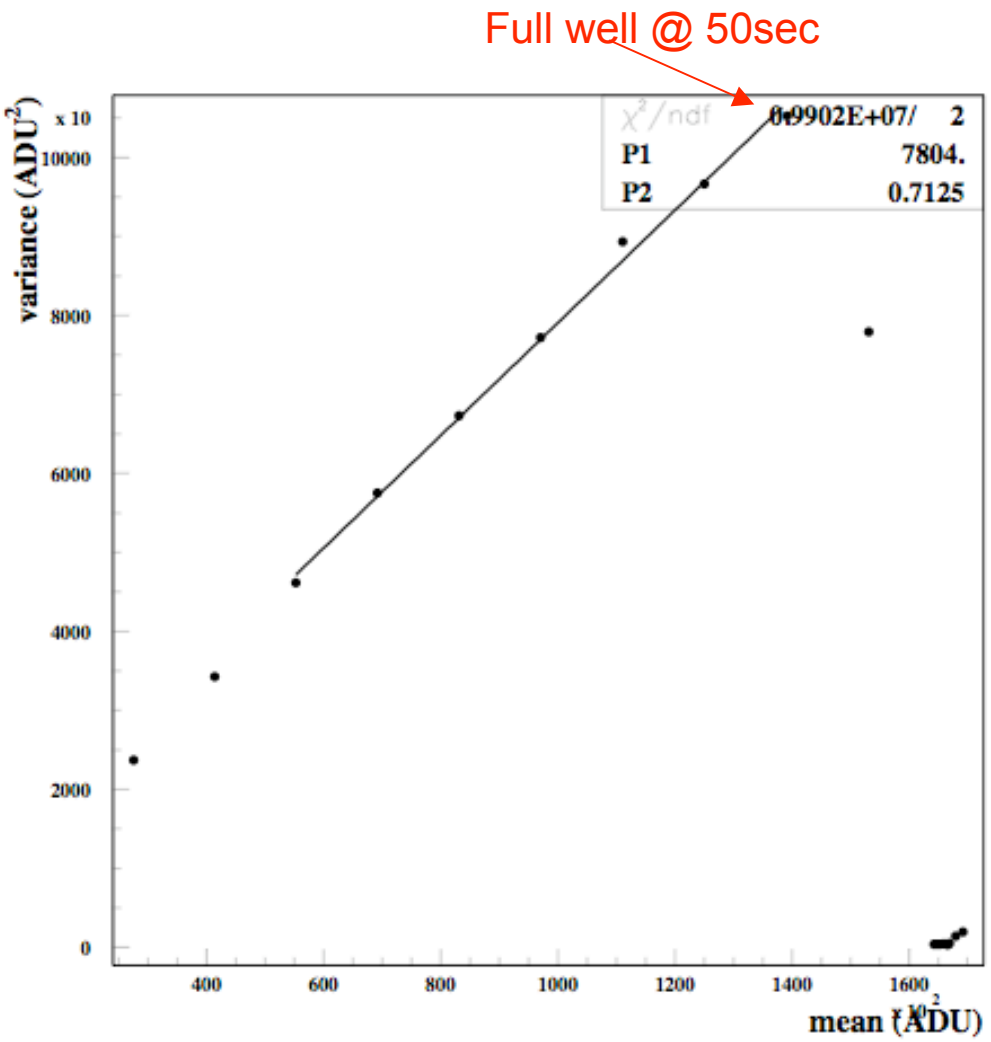
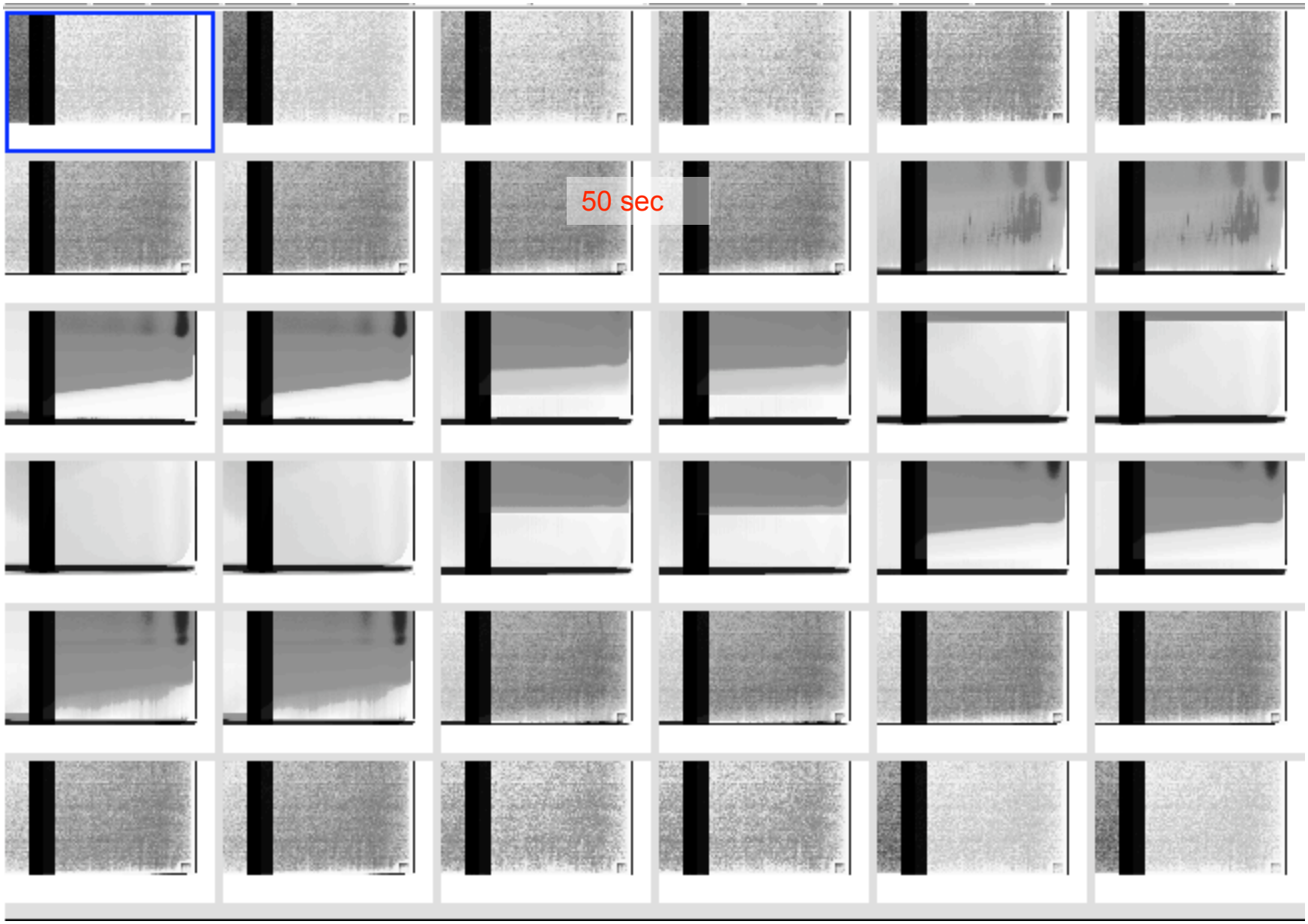


Figure 1: Photon transfer curve for the RH amplifier. The line corresponds to a linear fit to the data, the paremeters for the linear fit are shown in the plot.

S3-165



More potential traps than usual

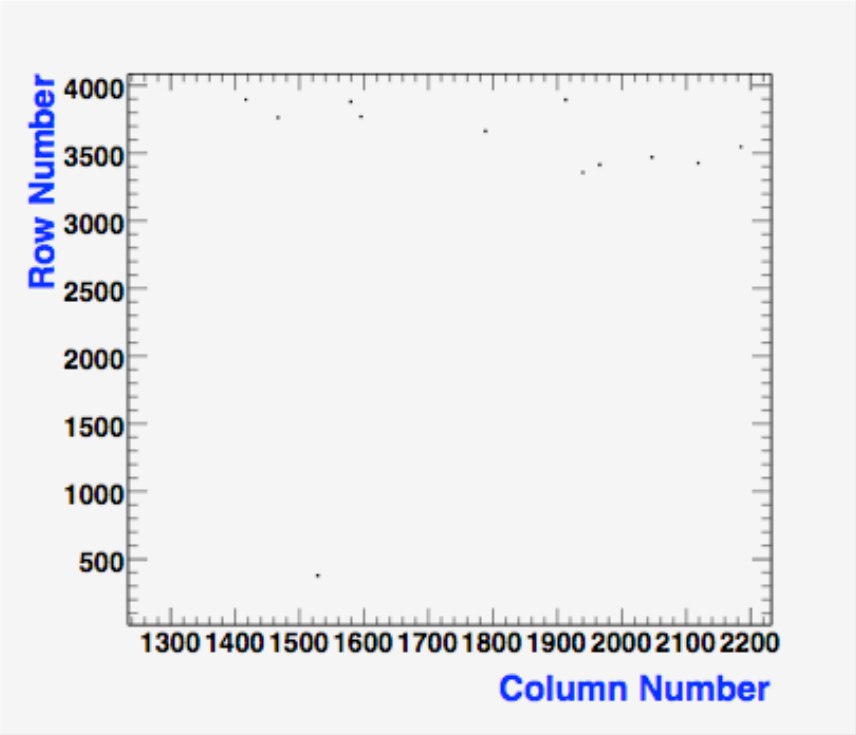


Figure 26: Trap location of the rightside of the CCD

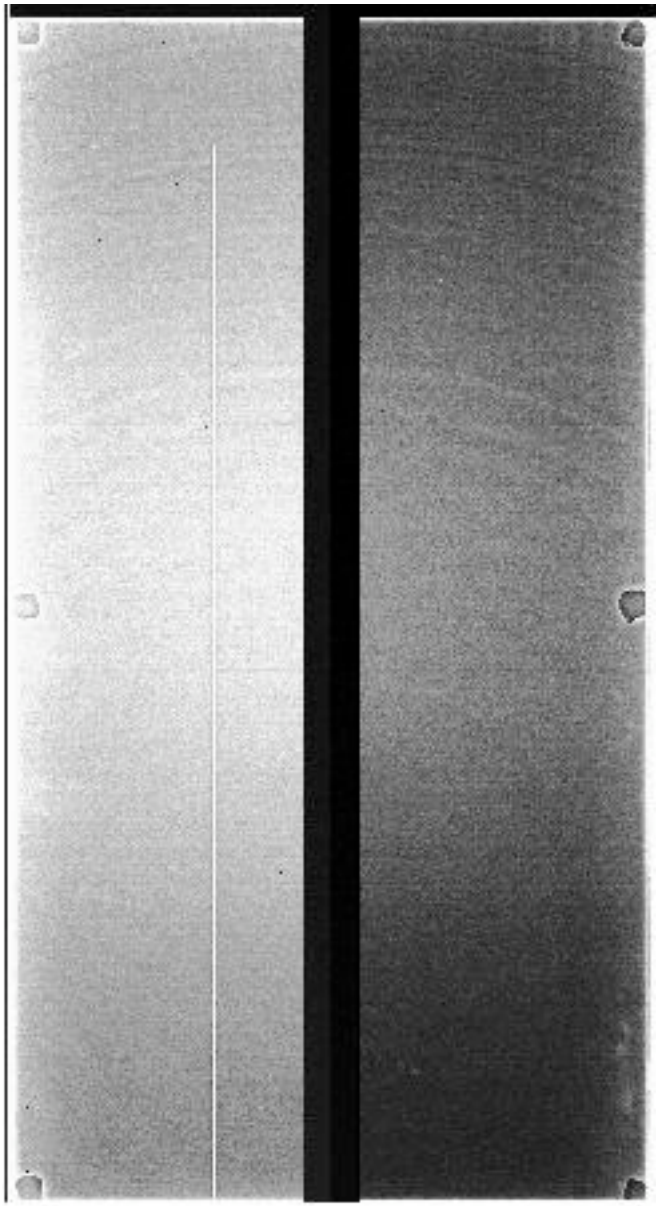
- 17 potential traps (not looked at by Steve & Hal yet, so some may be skyscrapers)
- But it's Interesting that they are all near the top
- Only a few are coincident with cosmetic defects

s3-166 124750-1-3 2E

S3-166

grade 2

science



S3-166

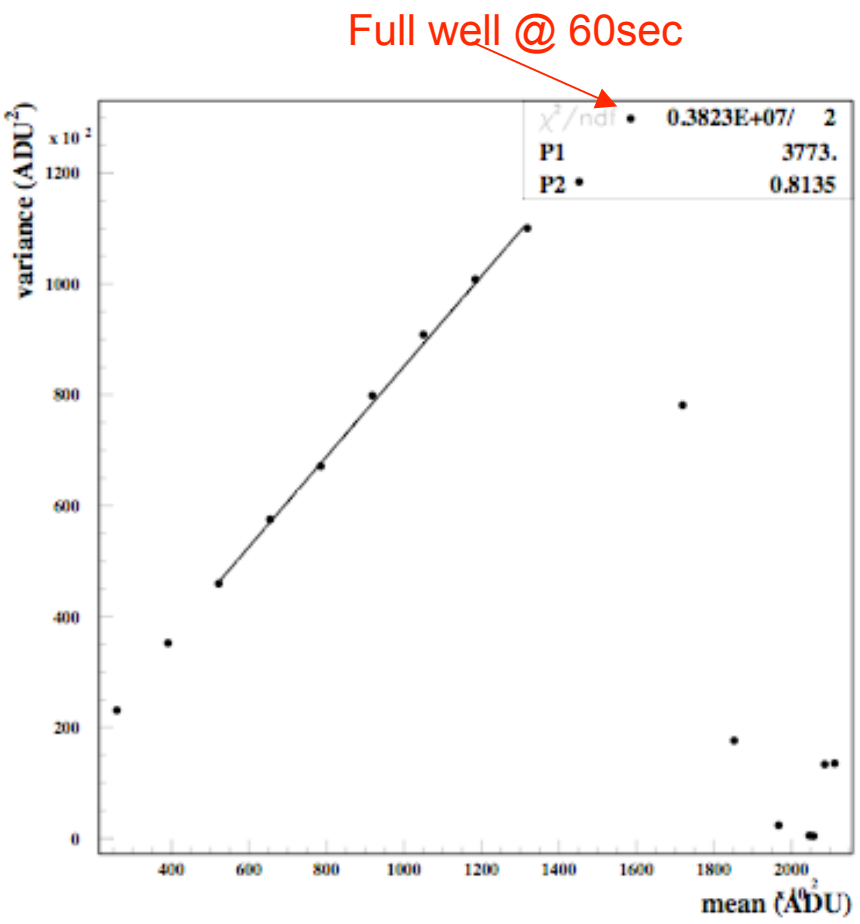
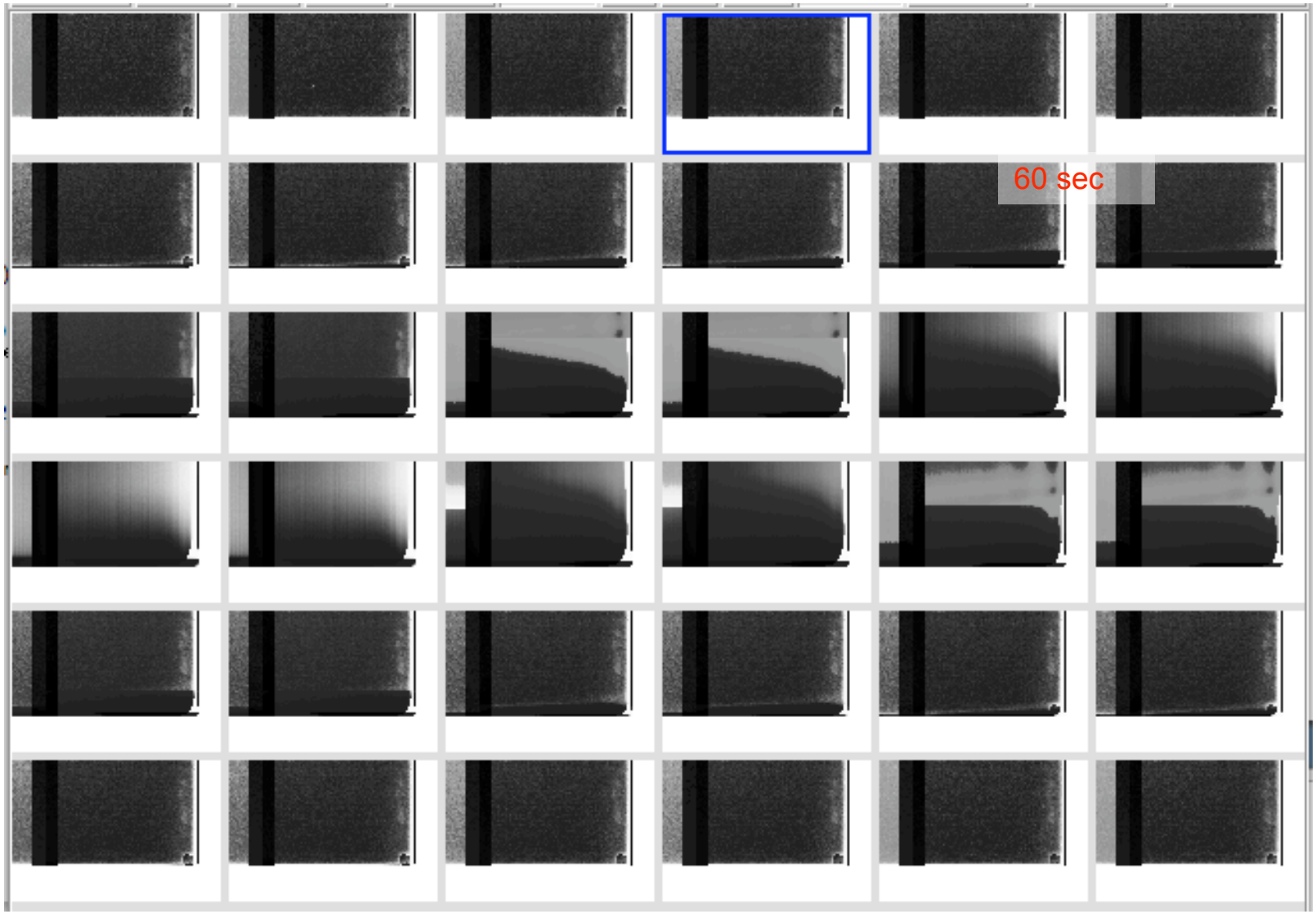


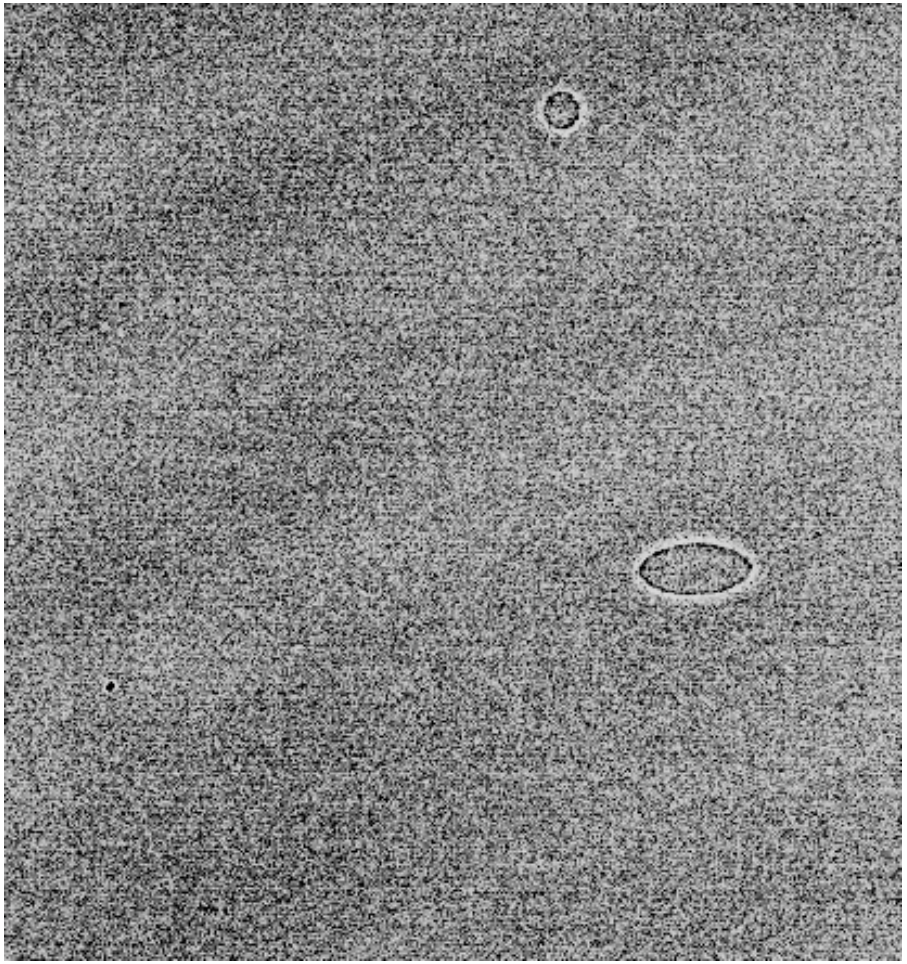
Figure 3: Photon transfer curve for the LH amplifier. The line corresponds to a linear fit to the data, the paremeters for the linear fit are shown in the plot.

S3-166



Many CCDs have spots like these

- Are these p+ donuts?
- Could determine by studying these features as f(wavelength)
  - Janesick, page 212



Difference between bright and dark ~3%

S3-166
Right vs. left QE a little different

In the past we saw this when the power at 400-500nm was very low, but in this case the lamp power at 400-500nm is not super-low compared to usual

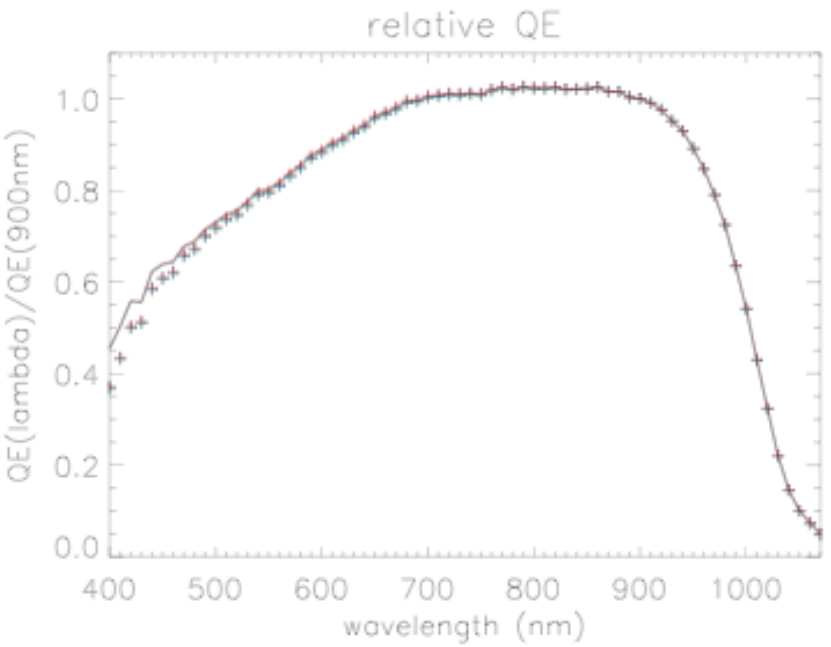


Figure 39: Relative QE with Kfactor applied

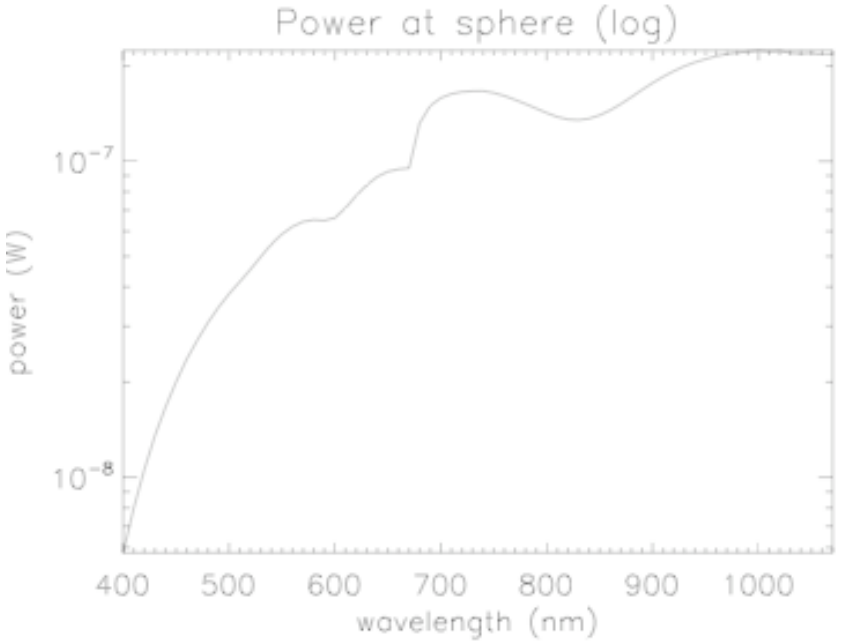


Figure 37: Power (log) vs. wavelength

S3-166

Left dark current a little higher (marginal)

Table 1. Dark Current

Amp	Dark Current (e/hour)
Left	27.675276
Right	10.962241

This measurement uses blank off plate

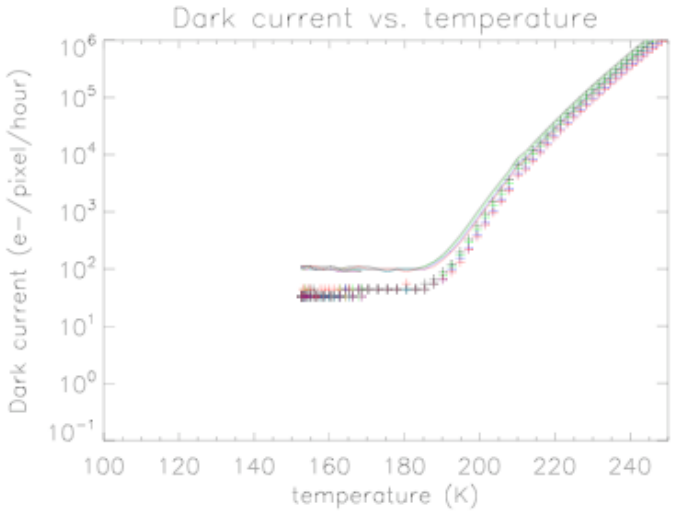
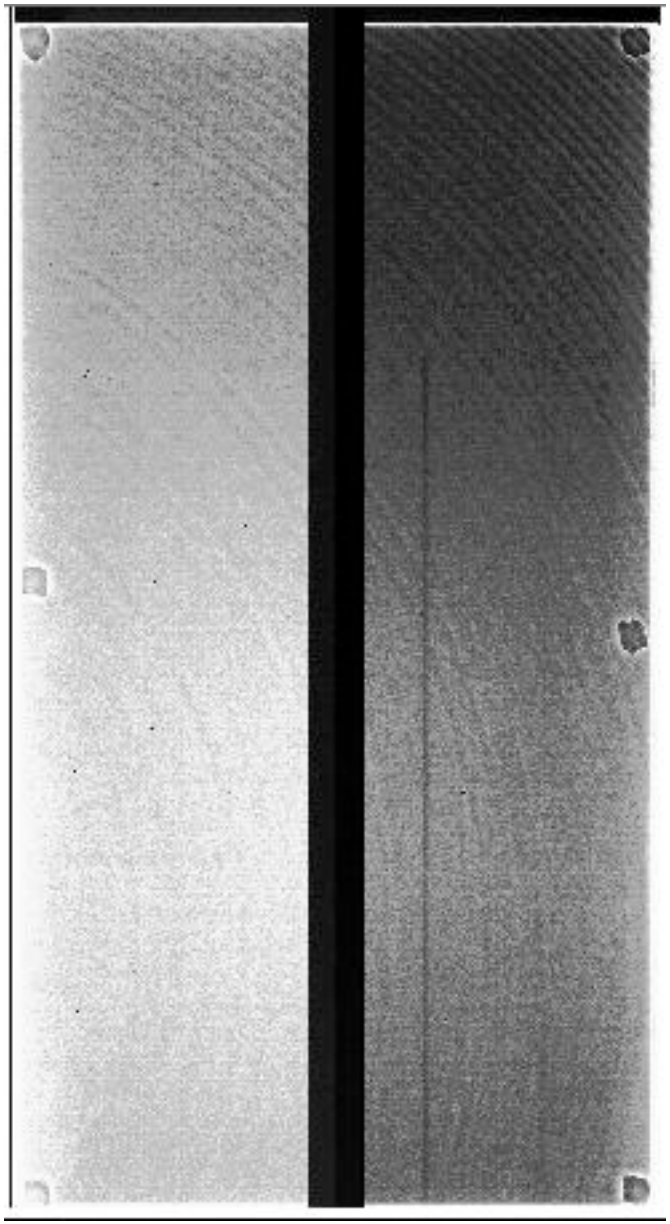


Figure 18: Dark current vs. temperature. The 8 regions on the previous figure are superimposed here for ease of comparison.

This measurement does *not* use blank off plate so dark current is higher

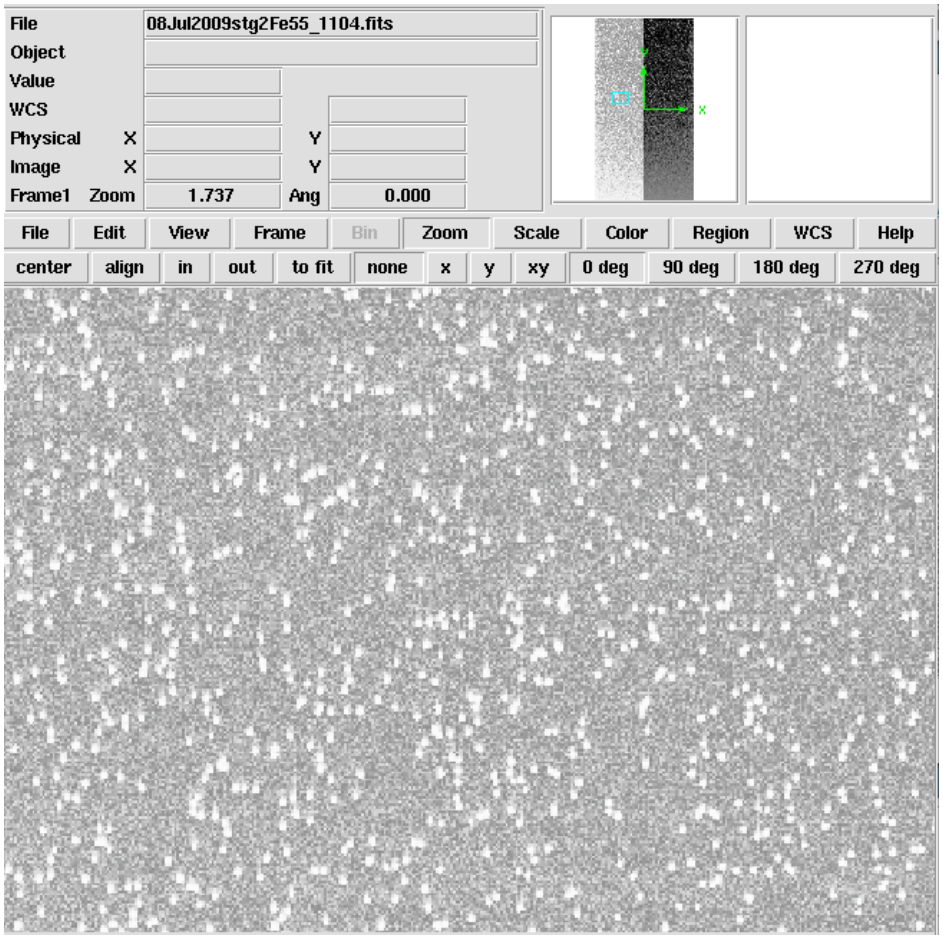
s3-152 124750-1-4 2E

S3-152



S3-152

bad V CTI in EPER and ^{55}Fe



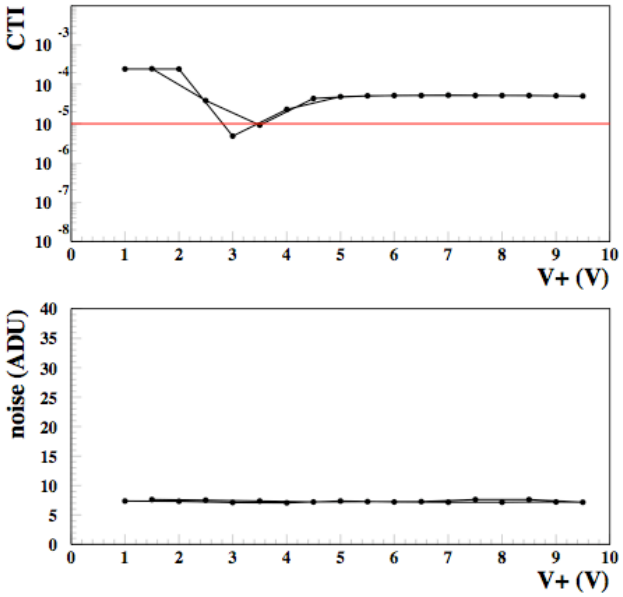


Figure 19: Top: Vertical CTI as a function of V+. Bottom: Measured noise as a function of V+.

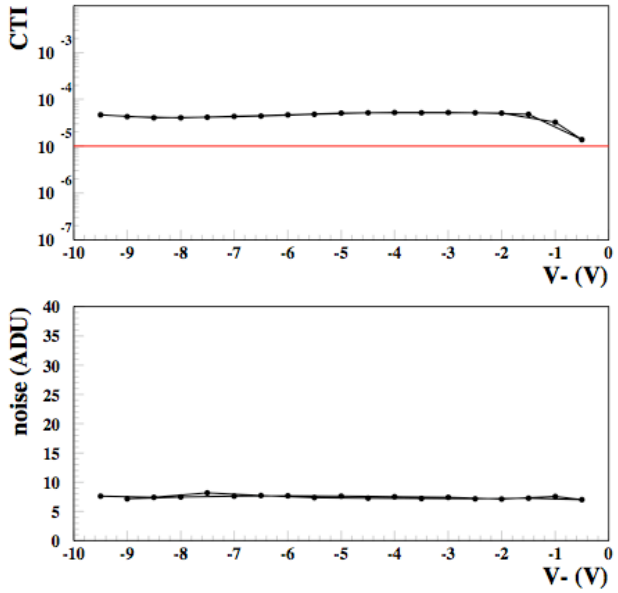


Figure 21: Top: Vertical CTI as a function of V-. Bottom: Measured noise as a function of V-.

S3-152

Right vs. left QE a little different

Power is low at 400-500 nm

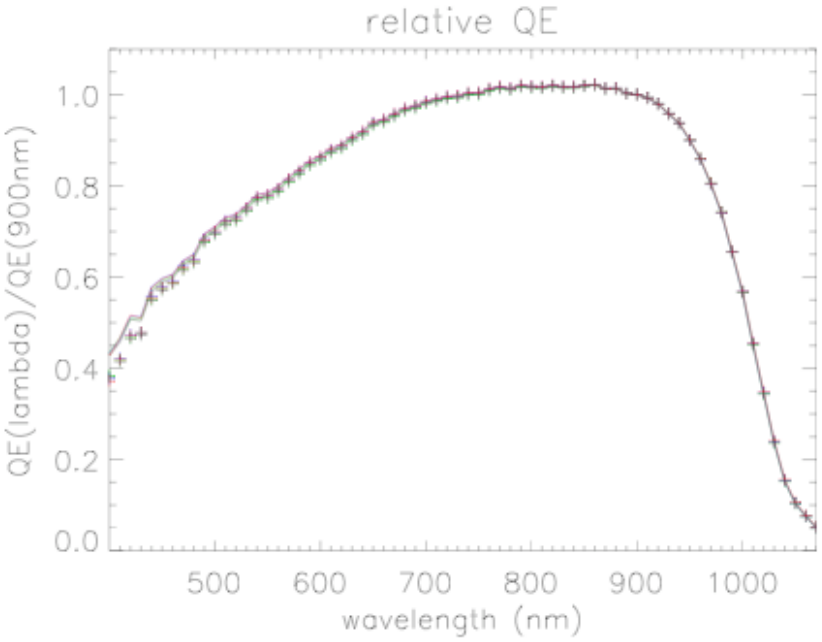


Figure 39: Relative QE with Kfactor applied

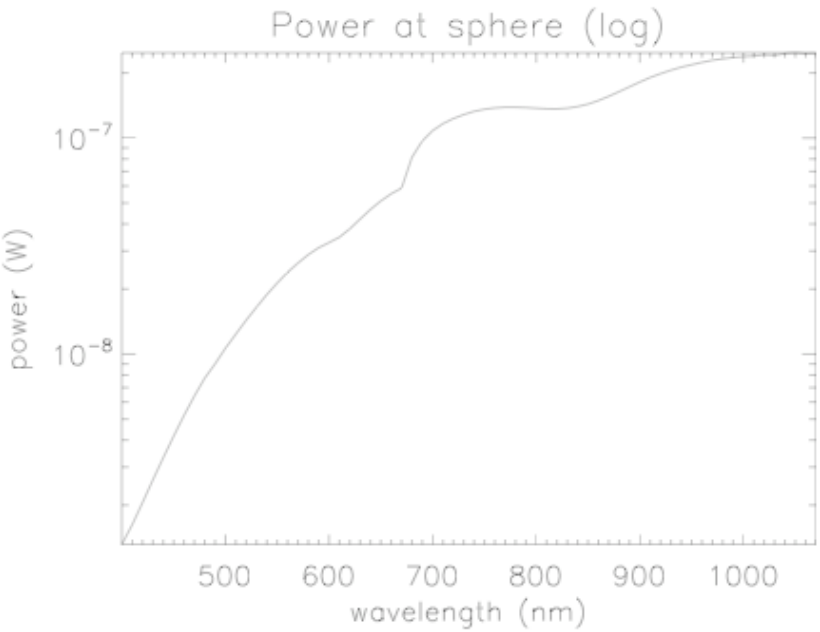


Figure 37: Power (log) vs. wavelength

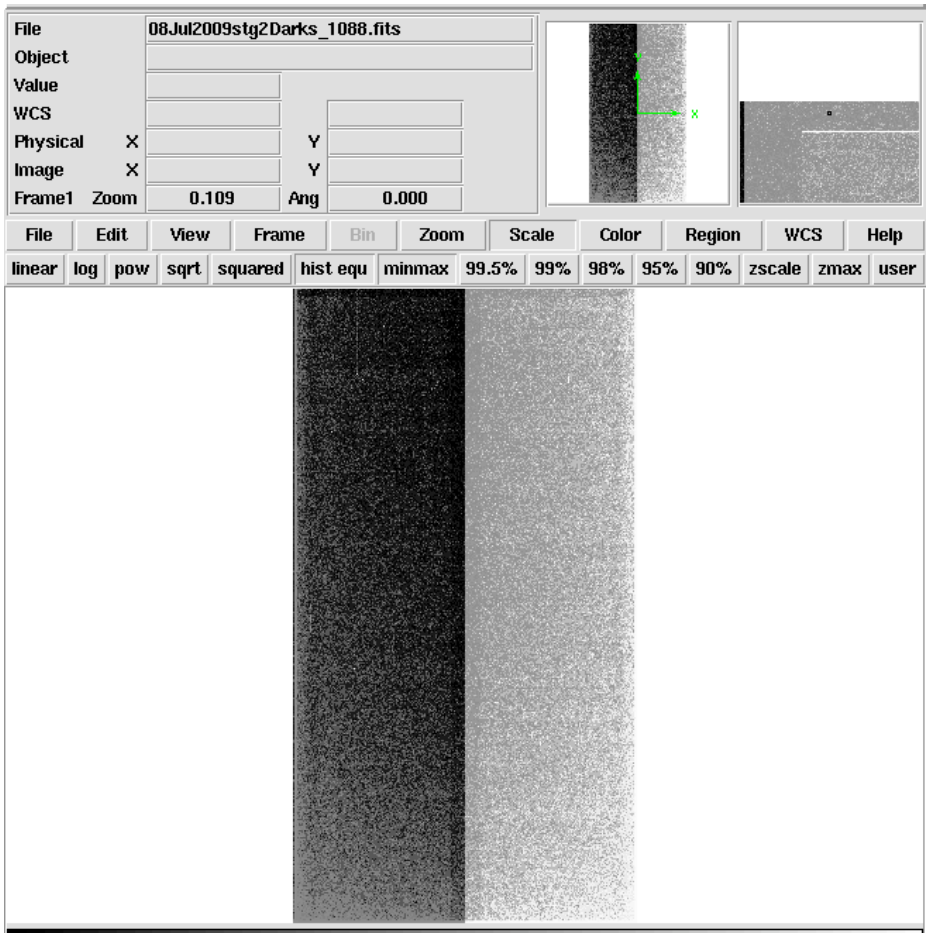
s3-171 112094-18-3 2A

S3-171

S3-171
marginal dark current

Table 1. Dark Current and related parameters. Before changing Vsub

Amp	Dark Current (e/hour)	(ADU/400s)	Std Dev (e/400s)	Min (e/400s)	Max (e/400s)
Left	34.134007	3.0000000	4.9453219	-17.067004	24.020227
Right	34.793813	3.0000000	5.1912717	-16.108247	28.994845



400 second dark

S3-171

Full well @ 60sec

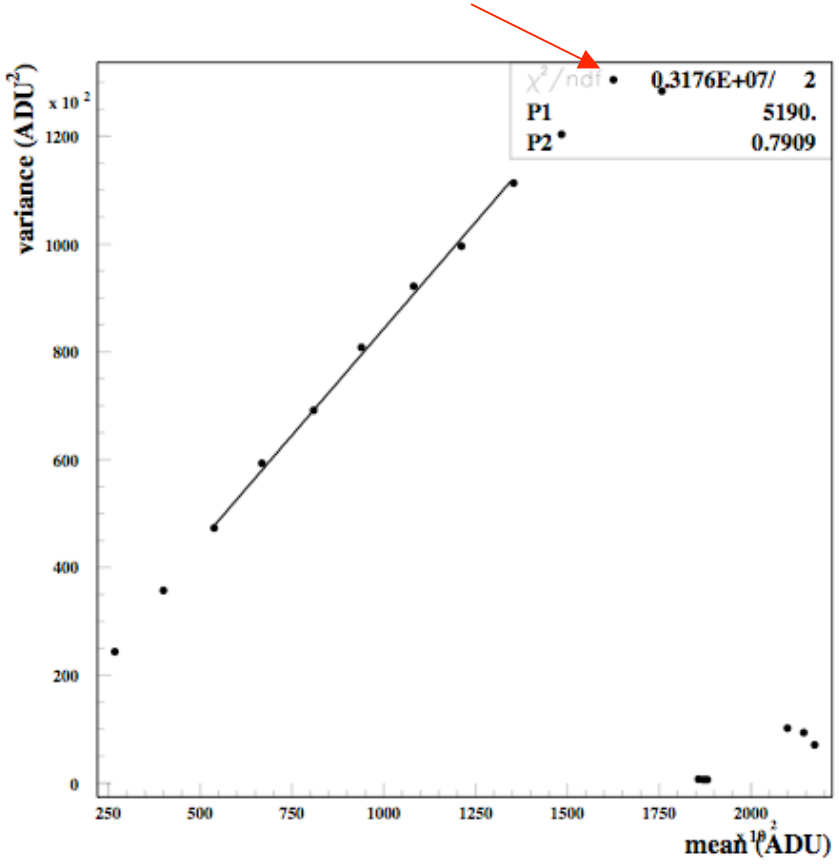
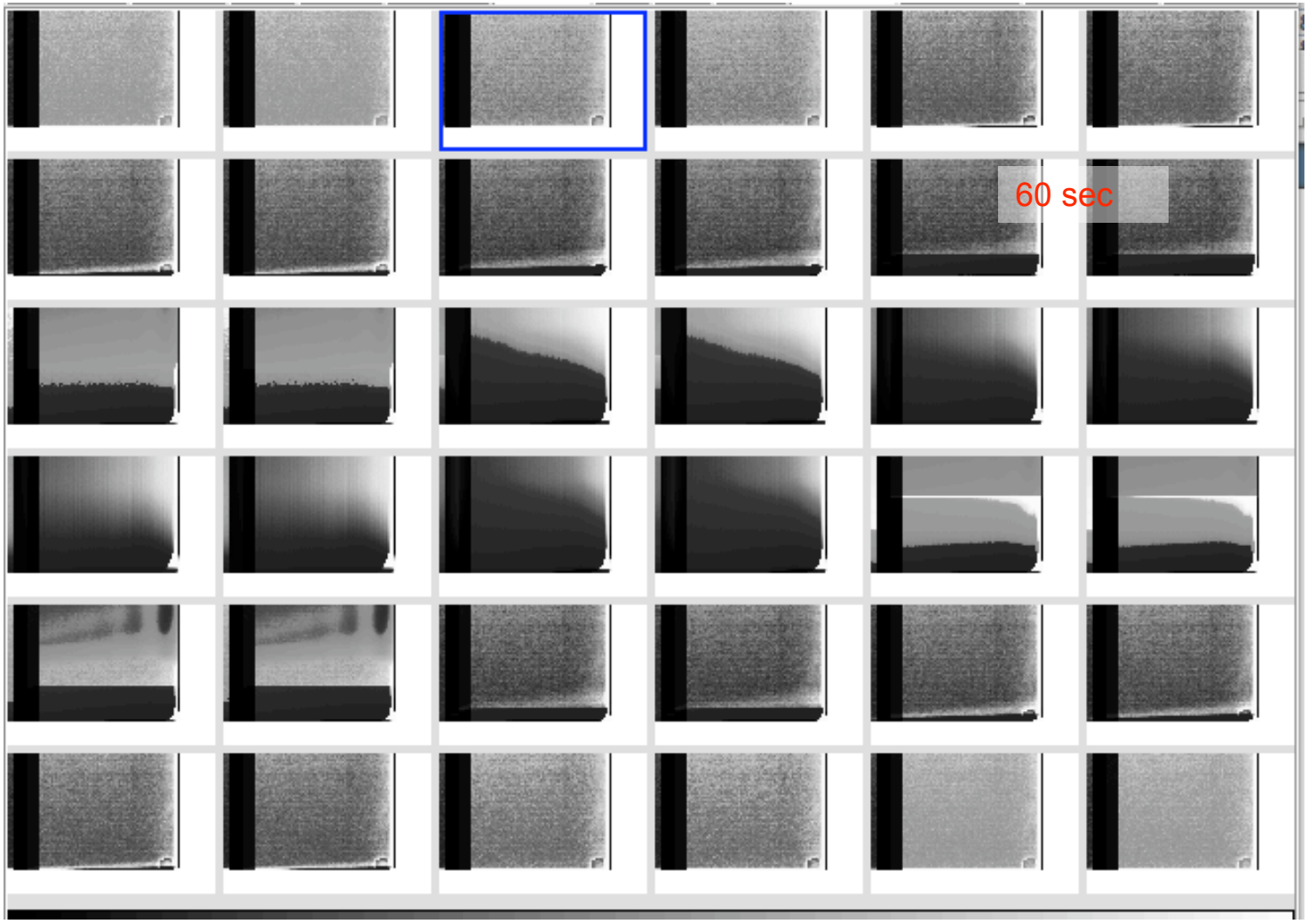


Figure 3: Photon transfer curve for the LH amplifier. The line corresponds to a linear fit to the data, the paremeters for the linear fit are shown in the plot.

S3-171

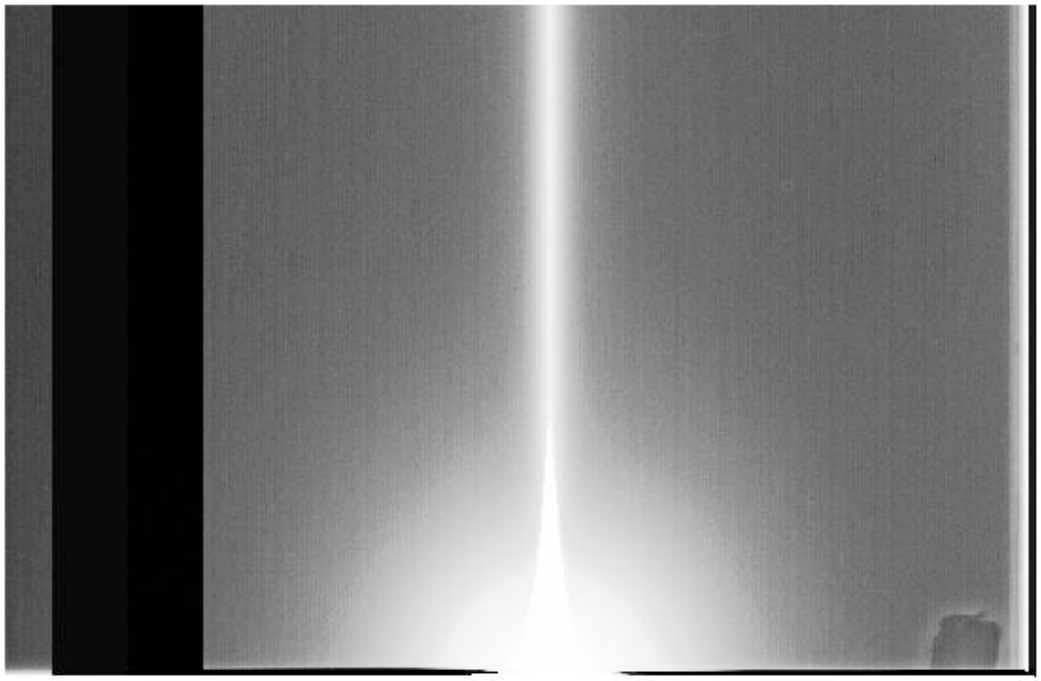


s3-179 112094-18-1 2A

S3-179
grade 0

S3-179

10 sec flat



10 sec flat

Zoom in

S3-179

10 sec dark

400 sec dark

400 sec dark

left edge

S3-179

10 sec dark

400 sec dark

400 sec dark

left edge

s3-183 123194-18-4 2C

S3-183
(-1) testing in progress